**2.9:**

**a.** For branch, branch\_name is the primary key.

For customer, customer\_name is the primary key.

For loan, loan\_number is the primary key.

For borrower, customer\_name and loan\_number are the primary key.

For account, account\_number is the primary key.

For depositor customer\_name and account\_number are the primary key.

**b.** For loan, branch\_name which references branch.

For borrower, customer\_name which references customer and loan\_numer referencing loan.

For account, account\_name referencing branch.

For depositor, customer\_name referencing customer and acoount\_number referencing account.

**2.13:**

a. Πloan\_number (σamount>10000(loan))

b. Πcustomer\_name (σbalance>6000(depositor ⋈ account))

c.Πcustomer\_name(σbalance>6000Λbranch\_name=”Uptown”(depositor⋈account))

**6.11**

**a.** Πperson\_name (σcompany\_name=”First Bank Corporation”(works))

**b.** Πperson\_name,city(σcompany\_name=First Bank Corporation”(works⋈employee))

**c.** Πperson\_name,street,city(σcompany\_name=First Bank Corporation” Λsalary>10000(works⋈employee))

**d.** Πperson\_name(σ (works⋈company⋈employee))

**e.** Πcompany\_name(company÷Πcity(σcompany\_name=”small bank corporation”)(company)

**6.13**

**a.** r1 ← company\_name**G**count-disinct(person\_name)(works)

ρ*r2*(*company name*,*num employees*)(*r*1)

r3 ← **Gmax(num\_employees)**（r2）

Πcompany\_name(r2⋈r3)

b. r1 ← *company name***Gsum**(*salary*)(w*orks*)

r2 ←**Gmin**(*payroll*)(ρ*r3*(*company name*,*payroll*)(*r1*))

Π*company name* (r3 ⋈ρ*r*4(*payroll*)(*r2*))

c. *r*1 ← *company\_ name***Gavg**(*salary*)(w*orks*)

*r*2 ← s*company\_name* = “First Bank Corporation”(*r*1)

Π*t*3.*company name* ((ρ*r*3(*company name*,*a*v*g salar y*)(*r*1))⋈*t*3.*a*v*g salary* > *first\_bank*\_*a*v*g\_salary* (ρ*first bank*(*company name*\_*a*v*g\_salar y*)(*r*2)))